Research Journal of Recent Sciences _____ ISSN 2277-2502
Vol. **3(4),** 7-13, April **(2014)** *Res.J.Recent Sci.*

The Effects of Product Market Competition on Capital Structure in firms listed in Tehran Stock Exchange, Iran

Hossein Rezaei Dolat Abadi, Ali Reza Eghbali, Hassan Heidary Soltan Abadi*
Islamic Azad University, Persian GULf International Educational Branch, Khuzestan, IRAN

Available online at: www.isca.in, www.isca.me
Received 23rd July 2013, revised 30th October 2013, accepted 19th December 2013

Abstract

The present study mainly evaluates the effect of product market competition on capital structure of companies listed in Tehran Stock Exchange (TSE) during 2001-2009. The present study discussed level and dimensions of product market competition including Tobin's Q ratio, substitutability of goods, barriers to entry, inventory turnover, market share, number of active companies and capital structure. The present study used systematic elimination method to collect samples. Considering the sampling method, 87 companies were selected from companies listed in TSE. Results showed a positive significant relationship between product market competition, market share and capital structure as well as a negative significant relationship between barriers to entry (investment intensity) and capital structure. Moreover, there was no significant relationship between Tobin's Q ratio, inventory turnover, substitutability of goods, number of active companies and capital structure.

Keywords: Capital structure, product-market competition level, product market competitiveness.

Introduction

Industrial and service-provider companies recently conduct their productive and business activities under conditions in which businesses and competition quickly change. Therefore, businesses need financial resources to determine capital structure for developing their operations and long-term objectives in order to surpass in competition with other businesses. Given that, financial resources are supplied in different ways, these units try to select the best financing options among available resources to determine capital structure. This would occur when businesses recognize important factors effective on capital structure and separately balance interests and costs of financing resources.

Capital structure of businesses shows different combinations of liabilities and equity. In other words, this combination shows the extent to which creditors and owners claim on assets and the extent to which liability and capital form capital structure. The main problem of businesses with formation of capital structure is to adopt financial resources from liabilities equity or a mixture of them by which capital cost decreases whereby enterprise value increases. To achieve this purpose, businesses need to determine capital structure by considering effective factors, advantages and disadvantages of resources forming capital structure; thus, effective factors play an essential role in optimal capital structure[1]. There are multiple effective factors on capital structure which make it difficult to decide on capital structure; this is why Myers[2] likened capital structure to a puzzle.

Harris and Raviv[3], Brander and Lewis[4], Kayhan and Titman[5], Leland[6], Fama and French[7], Ren Cheng and Shiu[8] and Guney et al.[9] found that effective factors on capital structure included firm size, profitability, unique products, tax, legal environment, market value to book value, dividend policy, fixed assets, intangible assets, research and development expenses, business product price, share price, economic conditions, cost of bank liabilities, lack of government control on environment and product-market competition level. They noted that optimal capital structure resulted from adopting a mixture of capital structure considering above factors by businesses.

As product market competition is a factor of survival in modern business world, it is essential to study product-market competition level while determining capital structure. Smithet al.[10] studied the relationship between capital structure and competitiveness of New Zealander companies during 1993-2006. They explain that whether liabilities influence on capital structure and competitiveness. The results show that companies use more liability to increase sales growth in order to achieve more profitability when sales of an industry are higher than other industries. Clayton[11] studied liability and capital by considering responsibility of limited liabilities and hunting model in competitive market of products. Their results indicated that liabilities of capital structure decreased product market competition; highly competitive companies used less liabilities and more capital in capital structure. As product market competition increases, liabilities alternated capital. In other words, highly competitive companies used more liabilities and less capital for their capital structure.

Aggarwal and Kyaw[12] studied the relationship between capital structures of multinational companies. They found that increase in abroad activities and competitiveness of multinational

companies resulted in less liability of capital structure compared to domestic companies.

Jianget al.[13] studied dynamic capital structure and competition level between Chinese companies during 1999-2004. Their results suggested that highly competitive companies had target capital structure (a certain leverage). As level of product market competition increased, deviation from target capital structure decreased; therefore, capital structure was less dynamic.

Guneyet al.[9] studied the rate of product market competition and capital structure of Chinese companies during 1994-2006. The results demonstrated a negative significant relationship between structure of product market competition (the rate was measured by Tobin's Q ratio) and capital structure. In this study, theories were tested in the form of both static and dynamic panel data; the former was estimated by least square method and the latter was estimated by generalized momentum.

In other words, high-level competitors had more cost of banking facilities as well as more financing cost compared to highly competitive companies. This high cost resulted from estimations of enterprises and banks to high competition level. In other words, banks and enterprises estimated risk by considering product-market competition level, liquidity and unpaid liabilities. As the result of this evaluation, high-level competitors incurred more financing cost than low- level competitors did. The present study evaluated hypotheses by panel data and regression.

Hypotheses and Variables: Separate hypotheses were used to study dimensions and level of product market competition and capital structure. Since the main objective of this study is to evaluate product-market competition level, competition level was considered as the main hypothesis and other hypotheses were studied as sub-hypotheses.

Main Hypothesis: Hypothesis 1: there is a significant relationship between effect of product-market competition level and capital structure of companies listed in TSE.

Sub-Hypotheses: i. There is a significant relationship between Tobin's Q ratio and capital structure of companies listed in TSE. ii. There is a significant relationship between substitutability of goods and capital structure of companies listed in TSE. iii. There is a significant relationship between barriers to entry (intensity of investment) and capital structure of companies listed in TSE. iv. There is a significant relationship between market share and capital structure of companies listed in TSE. v. There is a significant relationship between inventory turnover and capital structure of companies listed in TSE. vi. There is a significant relationship between number of active companies and capital structure of companies listed in TSE. vii. The dependent variable of this study included capital structure measured by total debt ratio (TDR) to total assets. Independent variables included dimensions of product market competition and product competition level, measured as follows.

Tobin's Q ratio: which is calculated by ratio of book value of liabilities in addition to market value of equity to total assets. Tobin's Q ratio represents enterprise value of product market competition; the higher ratio, the higher product market competition.

Substitutability of goods (DIFF): which is measured by ratio of operating profit to operating cost. In other words, low sales margin indicates severity of product market competition.

Barriers to entry (PPE): low barriers to entry into an industry in product market competition indicate high product-market competition level of that industry. To calculate barriers to entry, we use the ratio of fixed assets in addition to intangible assets to total assets.

Market share (MS): which is calculated by total sales of a company to total sales of the industry. High market share shows high competitiveness.

ITR: which is calculated by finished cost of the sold good to average inventory. The higher ITR, the more activity. The more activity, the lower product competition level.

Number of active firms (NFIRMS): Which is measured from logarithm of number of active firms in in all industries. Competition level of an industry is high when number of active companies increases.

Product-market competition level (SCORE-COMP): Which is measured by combination of product market competition and decile ranking criteria for a business. Control variables were calculated as follows.

Collateral value (CV):which is measured by ratio of fixed assets in addition to inventory to total assets.

Firm size (SIZE): which is calculated by logarithm of total assets.

Return on assets (ROA): which is calculated by operating profit to total assets.

Generating internal resources (CGIR): which is calculated by net ratio of operating cash flows to total assets.

Growth (GROWTH): which is calculated by the difference of current assets and last-year assets to last-year assets.

CR: which is current ratio of the company calculated by the ratio of current assets to current liabilities.

Methodology

The study included all companies listed in TSE since 1380 to late 1390.

Samples: Systematic elimination method as used to select samples; thus, to select the best sample, selected samples needed to be as follows: i. Companies should not be member of insurance companies and financial intermediaries. ii. Fiscal year should end at Isfand. iii. To investigate product market competition of different industries, the selected sample should be of industries with more than two active members. iv. Operating stop of businesses listed in TSE and their available financial data during 1380-1390 should not be more than three months.

Considering above characteristics, 87 companies were selected among 12 industries.

Model: Hypotheses were tested by static panel data.

Static Panel Data: The static panel data measures the effect of some independent variables on dependent variable. Regardless of previous values, static models estimate dependent variable of the model. Here, it is assumed that capital structure of earlier periods does not influence on capital structure of subsequent periods. Based on hypotheses of this study, the static panel data are as follows:

$$TDR_{it} = \beta + 0\beta 1Q_{it} + 2\beta DIFF_{it} + 3\beta MS_{it} + 4\beta PPE_{it} + 5\beta ITR_{it} + 6\beta LOG - NFIRMS_{it} + 7\beta COMP - SCORE_{it} + 8\beta CV_{it} + 9\beta Size_{it} + 10\beta ROA_{it} + 11\beta CGIR_{it} + 12\beta CR_{it} + 13\beta GROWTH_{it} + e_{it}$$

where, TDR_{it} shows capital structure of the firm i at time t; Q_{it} indicates market value of the firm i at time t; $DIFF_{it}$ represents substitutability of goods in the firm i at time t; MS_{it} is Market share of the firm i at time t; PPE_{it} indicates barriers to entry of the firm i at time t; ITR_{it} represents inventory turnover of the firm i at time t; $NFRIMS_{it}$ is number of active companies of the firm i at time t. $COMP_{it}$ shows product-market competition of the firm i at time t. CV_{it} represents collateral value of assets at time t for the firm i. $Size_{it}$ is size of the firm i at time t; ROA_{it} shows return on assets of the firm i at time t; $CGIR_{it}$ stands for generation of internal resources for the firm i at time t. CR is ratio of cash flow for the firm i at time t; and $GROWTH_{it}$ represents growth of the firm i at time t.

Results and Discussion

Collected data were analyzed by Eviews software, v.7. The main objective of this study was to investigate the relationship between capital structure as the dependent variable and independent variables related to competitiveness level of different industries listed in TSE. Considering studied panel data, therefore, panel data analyses were used, as follows.

Results from Statistic Analysis of Data: Descriptive statistics of the variables is shown in table 1.

The table 1 shows that the average TDR (capital structure) and standard deviation are 0.69 and 0.2, respectively, for all companies. In other words, the studied population was on average 62% financed by liabilities. Tobin's Q ratio indicates company's value to book value. On average, enterprise values increased by 1.719% to book value during studied period. Substitutability of goods represents ability to replace goods in the competitive market; on the other word, substitutability of goods will increase in product market competition if the ratio<1. Market share reflects average market share of a firm in product market competition.

Table-1
Descriptive statistics of the variables

Variable	Average	Standard deviation	Median	Minimum	Maximum	Observations
Capital structure (TDR)	0.692	0.202	0.687	0.135	2.357	783
Tobin's Q ratio	1.719	1.481	1.307	0.533	17.900	783
Substitutability of goods (DIFF)	-0.037	0.515	-0.075	-1.040	10.507	783
Market share (MS)	0.053	0.211	0.023	0.000	5.684	783
Barriers to entry (PPE)	0.270	0.176	0.229	0.033	0.901	783
Inventory turnover (ITR)	2.791	1.824	2.340	-1.497	12.528	783
Number of active firms (LOG_ NFIRM)	1.337	0.196	1.431	0.000	1.519	783
Product competition level (COMP_ SCORE)	0.571	0.118	0.567	0.250	0.983	783
Collateral value (CV)	0.505	0.190	0.513	0.044	1.143	783
Firm size (SIZE)	5.645	0.589	5.567	4.255	7.697	783
Return of assets (ROA)	0.195	0.221	0.134	-0.317	0.990	783
Generating internal resources (GCIR)	0.135	0.239	0.099	-0.714	4.589	783
Current ratio (CR)	1.217	0.581	1.125	0.096	5.836	783
Firm growth (GROWTH)	0.189	0.699	0.151	-15.549	4.846	783

Barriers to entry are on average 27% indicating low barriers to entry into product market competition. Inventory turnover represents annual sales of goods, which is on average 2.719. Number of active firms is 1.337; the ratio>1 shows the number of active companies in product market competition. The last independent variable is product-market competition level which is on average 57%; this ratio approaching to 1 indicates the intensity of product market competition.

Kruskal–Wallis Nonparametric Test: Following investigated observations by descriptive statistics and some intuitive conclusions related to variables of capital structure and competitiveness level of different industries, the following hypotheses were examined by appropriate statistical tests:

Hypothesis 1: Ho: there is no significant difference between capital structures of various industries. H1: there is a significant difference between capital structures of various industries.

Hypothesis 2: Ho: there is no significant difference between competitiveness levels of various industries. H1: there is a significant difference between competitiveness levels of various industries. Result of this test are shown in table 2.

According to the results of table 2, null hypothesis of both 1 and 2 are rejected in 0.05. Thus, results from test confirm that there is a significant relationship between capital structure and competitiveness level of different industries.

Stationary Test: Manayy test is shown in table 3. Stationary variables mean constant mean and variance of variables over time and covariance between years. As a result, these variables prevent spurious regression. Thus, Levine, Im, Pesaran and Dickey Fuller tests were used, as presented in Table 13.As the above table shows, P-value is < 0.05 for all variables. Therefore, variables are totally stationary in the studied period.

Table-2
Results of Kruskal–Wallis Nonparametric Test

Variables	**TDR**	**Q**	**DIFF**	**MS**	**PPE**	**ITR**	**LOG_NFIRM**	**TDR**	**COMP_SCORE**	**CV**	**SIZE**	**ROA**	**CGIR**	**CR**
Chi-square test	46.010	204.922	145.607	285.243	208.312	163.349	553.484	46.010	172.151	104.272	108.201	123.434	122.754	62.906
P-VALUE	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

Table-3
Manayy test

Variable Method	**Statistic**	**CV**	**CR**	**CGIR**	**SIZE**	**ROA**	**Growth**	**COMP_SCORE**
Levin, Lu and Cho	t	-7.85	-6.858	-9.15	-13.49	5.392	-15.62	-14.689
	P-value	0.00	0.00	0.00	0.00	1	0.00	0.00
Im, Pesaran and Shin	w	-3.12	-1.03	-6.29	-4.685	0.358	-7.905	-6.405
	P-value	0.0009	0.15	0.00	0.00	0.639	0.00	0.000
Dickie Fuller	chi	261.44	222.09	344.52	314.04	191.43	386.58	327.661
	P-value	0.00	0.008	0.00	0.00	0.17	0.00	0.000
Variable Method	**Statistic**	**TDR**	**Q**	**DIFF**	**MS**	**PPE**	**ITR**	**LOG_NFIRMs**
Levin, Lu and Cho	t	-8.61	-43.29	-8.88	-59.32	-13.35	-7.785	-9.96
	P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Im, Pesaran and Shin	w	-2.38	-9.50	-5.397	-15.05	-3.229	-4.074	-3.818
	P-value	0.007	0.00	0.00	0.00	0.00	0.00	0.0001
Dickie Fuller	chi	304.17	415.1	364.63	454.94	245.69	277.67	231.287
	P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.0008

Chow Test: Generalized Chow test and the statistic F-Lymer were used to choose between time-series data, cross-sectional data and panel data (table 4).

The results show that F-statistic is 3.324 and 3.1, respectively for cross-sectional effects and two-sided error and P-value is 0.00. Therefore, null hypothesis cannot be verified. Thus, cross-sectional effects and time effects exist; as a result, panel data needs be used to estimate the model. Considering time effects, P value = 0.58, which is not significant; thus, the model considering time effects is not significant without considering cross-sectional effects.

Hausman Test: Hausman test is used to determine whether the individual specific effects are correlated with explanatory variable. This test is based on the presence or absence of a relationship between regression errors and independent variables. Lack of this relationship leads to random effects. The null hypothesis suggests that there is no relationship between independent variables and estimation error; on the contrary, the opposite hypothesis suggests a relationship.

As shown in the table 5, p-value is < 0.01. Therefore, the null hypothesis is rejected in 0.01. This refers to a relationship between independent variables and estimated regression error. According to Chow and Hausman tests, therefore, constant effects model is the best method to estimate parameters.

Estimation of Model and Results from Hypotheses: A first-order self-regression process was added to the first model for model fitness in order to prevent serial self-correlation. The GLS method was also used with weights related to cross-sectional effects. The tables 6 summarizes results from model fitness.

Table-4
Chow test result

Cross-sectional effects	**Statistic**	**Degree of freedom**	**p-value**	**Result**
F	3.324	86.683	0.00	Panel data
Chi-square	273.72	86	0.00	
Time effects	Statistic	Degree of freedom	p-value	Result
F	0.828	8.675	0.58	Panel data
Chi-square	7.65	8	0.47	
Cross sectional- time effects	Statistic	Degree of freedom	p-value	Result
F	3.104	(94,675)	0.00	Panel data
Chi-square	281.37	94	0.00	

Table-5
Fixed effects model

Constant effects				
Result	**Chi-square**	**Degree of freedom**	**p-value**	**Result**
Random period	83.01	13	0.00	**Constant effects**

Table-6
Estimation models and results of research hypotheses

P-value	**T-Test**	**SD**	**Estimate Coefficient**	**Variables**
0.000000	5.086811	0.201862	1.026835	C
0.170700	1.371620	0.006081	0.008341	Q
0.213900	-1.244207	0.009865	-0.012274	DIFF
0.004400	-2.860754	0.057942	-0.165757	PPE
0.980200	0.024844	0.004548	0.000113	ITR
0.021000	2.314038	0.017946	0.041527	MS
0.905000	-0.119383	0.087141	-0.010403	LOG_NFIRMS
0.027300	1.096448	0.073624	0.080725	COMP_SCORE
0.000100	3.866084	0.051161	0.197793	CV
0.086200	-1.718873	0.027627	-0.047488	SIZE
0.000000	4.396345	0.019381	0.085204	ROA
0.076500	-1.774714	0.015062	-0.026730	CGIR
0.000000	-11.920070	0.012407	-0.147890	CR
0.171800	1.368227	0.004253	0.005819	GROWTH

As shown in the above table, the variables PPE, MS, CV, COMP_SCORE, ROA and CR are significant in 0.05. Coefficient of determination indicating the percentage of variation in the dependent variable per independent variable is 0.57 in this model.

That is, variables MS, CV, ROA, COMP_SCORE and CR explain 57% of variations in capital structure. Value of Durbin-Watson is 2.08, indicating that there is no self-correlation error in the model and errors are independence.

Discussion: Findings based on hypothesis 1: the relationship between product-market competition level and capital structure by static panel data.

As previously noted, the objective of this study was to investigate the effect of product market competition on capital structure. Results from static panel data show a positive significant relationship between product market competition and capital structure in 98% confidence level.

The results from this hypothesis are consistent with limited responsibility of liability and Hunting Theory. In the first theory, businesses implement increased production strategies to achieve more profit in suitable market conditions; thus, they use more liabilities in their capital structure because of limited responsibility of liabilities.

Hunting model also argues that high-level competitive companies use more liabilities for courageous behavior against potential competitors to control competition level. Therefore, high-level competitive companies use more liabilities in their capital structure to provide required financial resources in accordance with the two strategies including maximum production and courageous behavior.

Findings based on hypothesis 2: the relationship between Tobin's Q ratio and capital structure by static panel data: Static panel data model found no significant relationship between Tobin's Q ratio and capital structure. Since, Tobin's Q ratio shows enterprise value in a competitive market and higher-valued firms are expected to use more or less liabilities in their capital structure for their higher competitiveness, this relationship was not confirmed. As a result, companies listed in TSE do not consider Tobin's Q ratio which represents enterprise value and product market competitiveness for financial decisions on capital structure.

Findings based on hypothesis 3: the relationship between barriers to entry and capital structure by static panel data: The third hypothesis tested the relationship between barriers to entry and capital structure. In this study, barriers to entry are indicators of competition level, suggesting that industries with low barriers are more competitive than industries with high barriers to entry. Results of static panel data at confidence level > 95% show a negative significant relationship between capital structure and barriers to entry.

In other words, it can be concluded that companies with low barriers use more liabilities in capital structure because of higher competitiveness and companies with high barriers use less liabilities because of higher competitiveness. Also, hierarchy and fixed assets theories show that companies with high fixed and intangible assets use less liabilities in capital structure; because, firms with high fixed and intangible assets are afraid of bankruptcy risk.

Findings based on hypothesis 4: the relationship between substitutability of goods and capital structure by static panel data: Static panel data model found no significant relationship between substitutability of goods and capital structure.

Findings based on hypothesis 5: the relationship between number of active companies and capital structure by static panel data: Static panel data model found no significant relationship between number of active companies in product market competition and capital structure.

Findings based on hypothesis 6: the relationship between inventory turnover and capital structure by static panel data: Static panel data found no significant relationship between inventory turnover and capital structure in the. Thus, inventory turnover is not considered in capital structure.

Findings based on hypothesis 7: the relationship between market share and capital structure by static panel data: This hypothesis discussed market share of companies in competitive market and capital structure. The static panel data model shows a positive significant relationship between capital structure and market share in 98% confidence level.

Therefore, obtained results can be so interpreted that companies with greater market share use more liabilities in their capital structure for courageous behavior to reduce attractiveness of the industry and to prevent new competitors. In other words, they implement bankruptcy strategy in competitive game. On the other hand, it is the equilibrium theory and product market competition that firms with greater market share use more liabilities for cheaper financing in their capital structure than companies with a small market share.

Conclusion

The results obtained by this study indicate a positive significant relationship between capital structure and product-market competition level. Companies can use financing policies as a strategy for product market competition considering different conditions in order to maintain their competitive place.

Recommendations for Future Studies: i. To evaluate competitiveness and financial leverage, ii. To use other factors of competition in order to study its relation with capital structures.

References

1. Hang J. Binsbergen, v. R. J. Yang, G. Yang, J. Optimal Capital Structure, *Journal of Finance*, **62(3**), 2557-2586 **(2011)**

2. Myers S., The capital structure puzzle, *Journal of Finance*, **39(2),** 575–592 **(1984)**

3. Harris M. and Raviv A., The theory of capital structure, *Journal of Finance*, **46(3),** 297–355 **(1991)**

4. Brander J.A. and T.R. Lewis, Oligopoly and Financial Structure: the Limited Liability Effect, *American Economic Review*, 956-970 **(1986)**

5. Kayhan A. Titman, Sh., Firms, histories and their capital structures, *Journal of Financial Economics*, **83(2),** 1–32 **(2007)**

6. Leland H.E., Corporate Debt Value, Bond Covenants, and Optimal Capital Structure, *Journal of Finance*, **49,** 1213–1252 **(1994)**

7. Fama E.F. French R., Testing trade-off and pecking order predictionsabout dividend sanddebt, *The Review of Financial Studies*, **15(1),** 1-33 **(2002)**

8. RenChenga, S. Yi Shiu‹CHInvestor protection and capital structure, *J. of Multi. Fin.Manag*. **17**, 30–44 **(2007)**

9. Guney Y., Li L. and Fairchild R., The relationship between product market competition and capital structure in Chinese listed firms, *International Review of Financial Analysis*, **20(1),** 41-51 **(2011)**

10. Smith D.J., Chen J. and Anderson H.D., The relationship between capital structure and product markets: evidence from New Zealand, *Review of Quantitative Finance and Accounting*, **38(1),** 1-24 **(2012)**

11. Clayton M.J. Debt, investment, and product market competition: A note on the limited liability effect, *Journal of Banking & Finance*, **33(4),** 694-700 **(2009)**

12. Aggarwal R. and Kyaw N.A., Capital structure, dividend policy, and multinationality: Theory versus empirical evidence, *International Review of Financial Analysis*, **19(2),** 140-150 **(2010)**

13. Jiang F., Qu Y., Lu Z. and Li, YProduct market competition and dynamic adjustment in capital structure, *Frontiers of Business Research in China*, **4(1),** 101-129 (**2010)**